

## CLAIMS

1. System for conducting chemical and/or biochemical reactions, comprising a reaction substrate with a multiplicity of reactor zones, said reaction substrate having a substantially flat top surface and a substantially flat bottom surface, the reaction substrate being porous with a multiplicity of essentially parallel pores enabling liquid flow through, said pores having a diameter of about 10  $\mu\text{m}$  to 10 nm, characterised in that said flat top surface is bonded to the bottom of a first rigid support, said rigid support comprising a multiplicity of through going holes extending from the top of said rigid support to the bottom of said rigid support, and said through going holes defining the reactor zones.
2. System according to the previous claim, wherein a subset of said holes are, possibly reversibly, masked.
3. System for conducting chemical and/or biochemical reactions, comprising a reaction substrate with a multiplicity of reactor zones, said reaction substrate having a substantially flat top surface and a substantially flat bottom surface, the reaction substrate being porous with a multiplicity of essentially parallel pores enabling liquid flow through, said pores having a diameter of about 10  $\mu\text{m}$  to 10 nm, characterised in that part of said pores are masked by filling said pores with a masking polymer, the masked pores defining the outer borders of the reactor zones.
4. System for conducting chemical and/or biochemical reactions, comprising a reaction substrate with a multiplicity of reactor zones, said reaction substrate having a substantially flat top surface and a substantially flat bottom surface, the reaction substrate being porous with a multiplicity of essentially parallel pores enabling liquid flow through, said pores having a diameter of about 10  $\mu\text{m}$  to 10 nm, characterised in that
- (i) part of said pores are masked, by filling said pores with a masking polymer the masked pores defining the outer borders of the reactor zones; and
  - (ii) said flat top surface is bonded to the bottom of a first rigid support comprising a multiplicity of through going holes extending from the top of said rigid support to the bottom of said rigid support, and said through going holes defining the reactor zones.

5. System according to any of the previous claims, wherein chemical moieties, chemical building groups, chemical monomers, molecules or polymers are anchored to the walls of said pores.
- 5 6. System according to any of claims 2 to 5, wherein said masking is carried out by a masking polymer, including polyacrylamide, photocrosslinkable masking polymers and photoreactive glues.
7. System for conducting chemical and/or biochemical reactions according to any of the  
10 previous claims, wherein said chemical and/or biochemical reactions are monitored optically.
8. System according to any of the previous claims, wherein said chemical and/or biochemical reactions are polymer synthesis reactions, including nucleotide synthesis reactions, peptide synthesis reactions, and sugar polymer synthesis reactions.  
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9. System according to any of the previous claims, wherein said reaction substrate is made of an organic or inorganic material, such as aluminium oxide.
- 20 10. System according to any of the previous claims, wherein said reaction substrate is optically transparent or translucent.
11. System according to claims 1, 2, or 4 wherein said rigid support is bonded to the reaction substrate by moulding, glueing, thermal bonding, laser welding, chemical bonding and the like.  
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12. System according to the claims 1, 2 or 4 wherein, said rigid support is a chemical and/or temperature resistant material, such as Topas ® .
- 30 13. System according to the claims 1, 2, or 4, wherein said holes of said rigid support reversibly contain reaction components.
14. System according to any of the previous claim, wherein said holes contain a solvent, reagent, wash solution, enzymes or monomer used for the polymer synthesis reaction.

15. System according to any of the previous claims comprising a means for applying a pressure.
- 5 16. System according to any of the previous claims comprising a means for inducing a reversible flow through said reaction substrate.
- 10 17. System according to any of the previous claims, comprising a reaction manifold for selectively delivering particular solvents, reagents, wash solutions, enzymes and/or monomers to said reaction zones.
18. System according to the claims 1, 2 or 4, wherein said rigid support has at least 96, 384 or 1536 holes or reactor zones.
- 15 19. System according to any of the previous claims wherein the bottom surface of said reaction substrate is bonded to the top of a second rigid support, said second rigid support having through going holes extending from the top of the second rigid support to the bottom of the second rigid support, and said holes of the second rigid support are aligned with the holes of the first rigid support.
- 20 20. Use of the system according to any of the previous claims for conducting chemical and biochemical reactions, including the synthesis of polymers.
- 25 21. Use of the system according to any of the previous claims, wherein said polymers are oligonucleotides, peptides or sugar chains.
22. Use of the system according to any of the previous claims for synthesising in parallel different polymers.
- 30 23. Process to synthesise polymers, characterised in that said polymers are attached to the pores of a system according to any of the previous claims.
- 35 24. Apparatus for conducting chemical and/or biochemical reactions comprising a system according to any of the previous claims, an incubation device for holding said system, a loading station, possibly a dispensing and aspiration station, possibly a pressure or vacuum application station, and possibly a reading station.